
Determination of toxicity of a gas or gas mixture

Détermination de la toxicité d'un gaz ou d'un mélange de gaz



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10298 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*.

This second edition cancels and replaces the first edition (ISO 10298:1995), which has been technically revised.

Introduction

ISO 5145 “*Cylinder valve outlets for gases and gas mixtures — Selection and dimensioning*” and similar standards establish practical criteria for the determination of outlet connections of cylinder valves. These criteria are based on certain physical and chemical properties of the gases, in particular, the acute toxicity of the gases.

One of the difficulties in the application of ISO 5145 resides in the fact that, in the case of single components, there are abundant data in the literature (although differences may be found, depending upon the test methods employed), but in the case of gas mixtures, data in the literature are often incomplete or even non-existent.

The aim of this International Standard is to eliminate the ambiguities in the case of differences in the literature, to supplement existing data and to give a calculation method for gas mixtures.

Since the publication of the first edition of ISO 10298, this International Standard has been used for other purposes than the selection of cylinder valve outlets, e.g. providing toxicity data for the classification of gas and gas mixtures according to the international transport regulations and dangerous substances regulations, which since 2003 is under the umbrella of the Globally Harmonized System (GHS).

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Determination of toxicity of a gas or gas mixture

1 Scope

This International Standard lists the best available acute-toxicity data of gases from the literature to allow the classification of gases and gas mixtures.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

lethal concentration 50

LC₅₀

concentration of a gas (or a gas mixture) in air administered by a single exposure during a short period of time (24 h or less) to a group of young adult albino rats (males and females) which leads to the death of half of the animals in at least 14 days

2.2

toxicity level

level of toxicity of gases and gas mixtures

NOTE 1 In ISO 5145, the toxicity level is divided into three groups:

- Subdivision 1: non toxic [$LC_{50} > 5\,000$ ppm (volume fraction)]
- Subdivision 2: toxic [200 ppm (volume fraction) $< LC_{50} \leq 5\,000$ ppm (volume fraction)]
- Subdivision 3: very toxic [$LC_{50} \leq 200$ ppm (volume fraction)]

where

LC₅₀ values correspond to 1 h exposure to gas;

ppm (volume fraction) indicates parts per million, by volume.

NOTE 2 In the GHS, the inhalation toxicity levels are:

- | | |
|--------------------------------|---|
| Category 1: Fatal if inhaled | $0 \text{ ppm} < LC_{50} \leq 100 \text{ ppm (volume fraction)}$ |
| Category 2: Fatal if inhaled | $100 \text{ ppm (volume fraction)} < LC_{50} \leq 500 \text{ ppm (volume fraction)}$ |
| Category 3: Toxic if inhaled | $500 \text{ ppm (volume fraction)} < LC_{50} \leq 2\,500 \text{ ppm (volume fraction)}$ |
| Category 4: Harmful if inhaled | $2\,500 \text{ ppm (volume fraction)} < LC_{50} \leq 20\,000 \text{ ppm (volume fraction)}$ |

NOTE 3 In GHS, the LC₅₀ values correspond to 4 h exposure. Consequently, the LC₅₀ values given in Annex A (see 3.2.2) need to be divided by 2 (i.e. $\sqrt{4/1}$). The reasoning behind the division by 2 is given in Clause B.2.